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HAZARD RATING FOR SOUTHERN PINE BEETLE AND SURVEY FOR ANNOSUS ROOT ROT OF SELECTED LOBLOLLY PLANTATIONS ON THE YAZOO-LITTLE TALLAHATCHIE FLOOD PREVENTION PROJECT, MISSISSIPPI

by

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INTRODUCTION

Since the 1950's the Yazoo-Little Tallahatchie Flood Prevention Project has assisted in planting thousands of acres of closely-spaced loblolly pine for soil erosion abatement in a 19-county area of northern Mississippi. These plantings are primarily on the property of non-industrial landowners. Many of these plantations are now overstocked, stressed, and are expected to sustain heavy losses to the southern pine beetle (SPB) during a future outbreak. Thinning of these plantations should decrease susceptibility to SPB attack. However, Y-LT plantations in the past have suffered losses from annosus root rot (ARR) after thinning (Dooling and Galusha, 1965; Wolfe and Peacher, 1973) and intermediate cuttings to reduce SPB hazard may increase the incidence and severity of ARR where preventive measures are not employed.

A survey was conducted in March, 1982, in order to obtain information from selected plantations on the hazard to southern pine beetle (SPB) and on the status of annosus root rot (ARR). Information from this survey will be used to develop guidelines for managing stands for prevention of SPB and ARR attack. Several plantations will be used for examples to train resource managers in giving sound integrated pest management recommendations to landowners on the Y-LT.

Those assisting on the survey were John Arrechea, Jack Renfro, Leslie Allen, Troy Samples, Bobby Rideout, and Don Tomczak of the Y-LT and Evan Nebeker and Ron Honea of Mississippi State University.

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METHODS

Southern Pine Beetle: Y-LT personnel provided a list of 10 plantations representing a range of conditions which would likely be encountered by field foresters. The following general criteria were used:

1. Five acres or larger
2. Readily accessible
3. Detailed management plan on file
4. At least five counties should be represented by the ten plantations
5. Suitable for field trips during training sessions.

Each plantation was hazard rated for risk to SPB according to 6 different systems which are currently being evaluated jointly by the MFC and Mississippi State University (MSU) in order to select a method for use in the state. The data for the ratings (Appendix I) were collected by taking one BAF 10 prism plot for each 5 acres of plantation. Data were analyzed by MSU.

Annosus Root Rot--All standing dead trees occurring in plots were inspected at the base for conks of Heterobasidion annosum to verify their infection. When plots contained mortality due to ARR, volume loss was calculated for the plantation utilizing the average total height of the plantation, dbh of live and dead trees, point sampling expansion factors (Avery, 1967) and a volume table for cordwood (USDA For. Serv. 1976). When plots did not contain mortality due to ARR, nearby areas were searched for standing dead or windthrown trees with conks at the base to verify infection of the plantation. Soil series was determined from soils maps for each plantation and rated high or low hazard for ARR according to Froelich et. al. (1977).

RESULTS

SPB Hazard Rating--Table 1 shows stand data. Note that 5 out of the 11 plantations had a pine basal area of 120 or over (considered highly susceptible to SPB). These same plantations were the ones rated high or very high for the average of the 6 different methods (table 2) (Belanger, et al. 1979; Ku, et al. 1980; Kushmaul, et al. 1979; Mason, et al. 1980).

Annosus Root Rot--Data on ARR from the 11 plantations are summarized in table 3. ARR was found to be present in 45% of the plantations. It occurred on both thinned and unthinned plantations and on high and low hazard soils. Seventy-five percent of the time it occurred in thinned plantations and 80% of the time on high hazard soil series. It occurred in 66% of the thinned plantations examined, regardless of years since thinning and soil series. When the last thinning was over 3 years ago, 75% of plantations were infected with ARR.

Standing dead trees killed by ARR were found in one plot in each of two plantations. This mortality amounted to 2.7 and 8.7% in plantations #6 and #9 respectively. Both plantations were on high hazard soil series.

DISCUSSION

As expected some of the plantations examined for SPB hazard were high hazard, some medium and some low. These ratings provide examples of the range of

stand conditions currently existing on the Y-LT and how they relate to SPB hazard. They do not give an overall estimate of the number of stands rated as high, medium, or low hazard for SPB, however, the data from sample stands will be valuable for training management foresters in SPB hazard rating, prevention of SPB infestations and in enhancing their understanding of how stand conditions create hazard.

ARR was present in a number of the plantations examined, but was most commonly found in thinned plantations or on high hazard soils. The percent of infected plantations is somewhat lower than might be expected based on previous surveys (Dooling and Galusha, 1965; Wolfe and Peacher, 1973). However, the small number of plantations examined and the selection method preclude direct comparison.

Volume loss calculations on the two plots probably represent mortality over the last several years. Results of this survey will be compared with similar reports in the literature and used for training purposes.

Table 1. Mean Y-LT stand data used for SPB hazard rating.

Stand No.	Total Basal Area (Ft^2/acre)	Pine Basal Area (Ft^2/acre)	Radial Growth[1/] (0-5 yrs) (mm)	Radial Growth[2/] (6-10 yrs) (mm)	Age	Site Index	Trees per/acre	Diameter (in.)
1	110	107	11	30	19	98	734	5.9
2	80	77	9	8	34	73	310	8.3
3	150	150	10	10	29	84	558	7.4
4	200	195	12	24	24	96	1045	6.8
5	105	105	13	19	29	105	175	10.7
6	152	146	9	12	14	98	210	13.6
7	60	60	13	17	24	113	142	9.0
8	160	160	7	18	34	94	431	8.8
9	130	120	13	10	31	98	490	11.9
10	80	80	14	17	30	125	103	12.1
11	70	68	10	23	18	98	324	7.2

1/ Outer five growth rings

2/ Next five growth rings

Table 2. SPB hazard ratings for Y-LT stands[1/]

		RATINGS							
Stand	County	Sader	Mason	Ku	Belanger	Kushmaul A	Kushmaul B	Average	Rating
1	Lafayette	3	2	4	3	3	3	3.0	Medium
2	Lafayette	1	2	3	3	3	2	2.3	Low
3	Lafayette	3	4	5	3	5	5	4.2	High
4	Marshall	3	4	5	4	5	5	4.3	High
5	Marshall	2	3	3	2	3	3	2.7	Medium
6	Marshall	3	5	4	3	5	5	4.17	High
7	Yalobusha	1	2	3	1	2	2	1.8	Low
8	Yalobusha	5	3	5	4	5	5	4.5	Very High
9	Carroll	3	3	4	3	4	4	3.5	High
10	Carroll	1	3	3	1	3	3	2.3	Low
11	Carroll	3	1	3	3	2	2	2.3	Low

[1/] Stands were rated as follows: 1-very low; 2-low; 3-medium; 4-high; and 5-very high

Table 3. Plantation conditions, ARR infection and losses.

Stand No.	County	No. Sample Points	ARR Soil Hazard	Thinned	Date Last Thinned	ARR Present in Plantation	% Standing Tree Tree Mortality due to ARR[1/]
1	Lafayette	3	Low	No	--	No	--
2	Lafayette	3	Low	Twice	79	Yes	--
3	Lafayette	2	Low	No	--	No	--
4	Marshall	2	High	No	--	Yes	--
5	Marshall	2	High	Once	81	Yes	--
6	Marshall	5	High	Twice	68	Yes	2.7%
7	Yalobusha	1	Low	Once	81	No	--
8	Yalobusha	1	High	No	--	No	--
9	Carroll	2	High	Once	74	Yes	8.7%
10	Carroll	1	High	Twice	79	No	--
11	Carroll	5	High	Once	81	No	--

[1/] Calculated only for plantations with ARR mortality occuring within a sample plot.

Appendix I

SPB RISK RATING PARAMETER DEFINITIONS

STAND NUMBER - stands numbered consecutively for each crew

ACRES IN STAND - stands are to be divided by timber type, not ownership; one ownership may have several stands; not less than five acres

SAMPLE POINT NUMBER - at least two samples per ten acres in the stand; set up on a grid pattern if possible

TIMBER TYPE - record the code for the timber type found on each sample point 1 - sawtimber (larger than 11.6 inches DBH), 2 - large pole to small sawtimber (9.6-11.5 inches DBH), 3 - pole (5.0-9.5 inches DBH), 4 - pulp or regeneration (less than 5.0 inches DBH); all of the sample points in a stand should have the timber type, however there may be enough variation within a stand for a sample point to have a slightly different timber type

BASAL AREA MEASUREMENTS - square feet per acre (10 BAF prism)

SPECIES OF HEIGHT MEASUREMENT TREES - record the code of the species of the tree on which the total height and height to the first limb are measured (1 - loblolly; 2 - shortleaf)

PINE TOTAL HEIGHT AND HEIGHT TO FIRST LIVE LIMB - measured on three dominant or codominant pine trees on each sample point (feet); all three trees must be the same species (either loblolly or shortleaf)

AGE AND RADIAL GROWTH MEASUREMENTS - obtained from a core taken from one tree per sample point with an increment borer at breast height (4.5 ft); a hand lens should be used; measured in mm; these measurements should be taken from one of the trees measured for height data

LANDFORM - recorded for each sample point (1 - ridge, 2 - upper slope, 3 - middle slope, 4 - lower slope, 5 - minor bottom)

% SHORTLEAF - record code 1 or 2 (1 - more than 50% shortleaf pine, 2 - less than 50% shortleaf)

PAST SPB - record code 1 or 2 (1 - SPB have been observed in the stand in the past, 2 - SPB have not been observed in the past); recorded for each sample point

DISTURBANCE - recorded for each sample point (0 - no disturbance, 1 - lightning, 2 - logging last 5 years, 3 - hail damage, 4 - fire within the last 5 years)

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